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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,001	10/30/2003	Hidenori Usuda	9319S-000575	7423

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EXAMINER	
FIDLER, SHELBY LEE	

ART UNIT	PAPER NUMBER
2861	

MAIL DATE	DELIVERY MODE
11/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/698,001	USUDA ET AL.	
	Examiner	Art Unit	
	Shelby Fidler	2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13,16-28 and 31-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,16-28 and 31-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/14/2007 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 and 16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Currently amended claim 16 presents the following limitations:

"approximating a temperature of the piezoelectric element based on the sensed temperature of the drive integrated circuit;

approximating a temperature of a diaphragm disposed adjacent to the piezoelectric element;

approximating a temperature of a discharge liquid disposed adjacent to the piezoelectric element based on the approximated temperature of the diaphragm; and

selecting between a normal drive signal and a cooling drive signal based on the approximated temperature of the discharge liquid."

Upon review of the original disclosure, Examiner was unable to find the abovementioned temperature approximation steps. Examiner notes that page 15 of the instant specification teaches that the drive integrated circuit, the fixed substrate, the piezoelectric element, and the discharge liquid are thermally coupled such that a detected temperature in the drive integrated circuit substantially accurately detects the temperature of the discharge liquid. However, the original disclosure does not teach the individual steps of approximating the temperatures of the piezoelectric element, the diaphragm, and the discharge liquid.

Further regarding claims 1 and 16, the original disclosure is also fails to teach the claim limitation of "selecting between a normal drive signal and a cooling drive signal based the approximated temperature of the discharge liquid." Rather, the original disclosure expressly states that the arithmetic control section 8a is configured so as to generate the waveform selection data on the basis of the temperature detection signal (page 13).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 5, 8, 16, 17, 20, 23, and 33-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Kimura et al. (US 6386672 B1).

Regarding claims 1 and 16:

Kimura et al. disclose a droplet discharging apparatus comprising:

means for discharging a discharge liquid (recording head) in the form of droplets through an aperture (nozzle opening 2) by mechanically deforming a piezoelectric element (piezoelectric vibrator 9) by a normal drive signal (col. 9, lines 4-9);

a drive integrated circuit (semiconductor integrated circuit 20) disposed adjacent to and in thermal contact with the piezoelectric element (Fig. 2);

a control unit (drive circuit shown in Fig. 22) that selects between the normal drive signal (drive signal corresponding to T1) and a cooling drive signal (drive signal corresponding to T2) and supplies the selected normal drive signal or cooling drive signal to the drive integrated circuit (col. 8, lines 40-57 and Fig. 22);

a substrate (fixed base 18) attached to and in thermal contact with the piezoelectric element and the drive integrated circuit (Fig. 2);

a diaphragm (elastic plate 10) disposed adjacent to and in thermal contact with the piezoelectric element (col. 3, lines 32-35 and Fig. 2); and

a temperature sensor (diode forming area 66) associated with the drive integrated circuit (Fig. 20a) for sensing a temperature of the drive integrated circuit (col. 8, lines 7-8);

wherein the sensed temperature of the drive integrated circuit approximates a temperature of the piezoelectric element (it is inherent to the invention of Kimura et al. that the sensed temperature of the drive integrated circuit approximates a temperature of the piezoelectric element since they are thermally coupled as shown in col. 9, lines 10-14 and Fig. 2);

wherein the approximated temperature of the piezoelectric element approximates a temperature of the diaphragm (it is inherent to the invention of Kimura et al. that the approximated temperature of the piezoelectric element approximates a temperature of the diaphragm since they are thermally coupled as shown in col. 9, lines 10-14 and Fig. 2);

wherein the approximated temperature of the diaphragm approximates a temperature of the discharge liquid (it is inherent to the invention of Kimura et al. that the approximated temperature of the diaphragm approximates a temperature of the discharge liquid since they are thermally coupled as shown in col. 9, lines 10-14 and Fig. 2);

wherein the control unit selects between the normal drive signal and the cooling drive signal based on the sensed temperature of the integrated circuit, which approximates a temperature of the discharge liquid (col. 8, lines 40-55);

wherein the droplets are discharged from the aperture based on the selected normal drive signal or cooling drive signal (col. 8, lines 47-57); and

wherein a flushing process is implemented between cycles of normal discharge to set the temperature of the discharge liquid to a predetermined temperature (col. 9, lines 25-41 shows that the drive signal levels are changed to reduce the temperature back to below basic level T1; this comprises the claimed "flushing process").

Regarding claims 2 and 17:

Kimura et al. also disclose that the droplets are discharged for a plurality of times by the cooling drive signal (inherent to col. 8, lines 47-50 since the temperature ranges are so large). so as to cool the discharge liquid to a specified temperature (col. 5, lines 32-37).

Regarding claims 5 and 20:

Kimura et al. also disclose that, if the temperature of the discharge liquid detected by a temperature detecting means exceeds a predetermined threshold temperature (e.g. 10 degrees Celsius), then the droplets are discharged from the aperture by the cooling drive signal (col. 8, lines 52-54).

Regarding claims 8 and 23:

Kimura et al. also disclose that the discharge liquid is a printing ink (col. 9, lines 4-9).

Regarding claim 33:

Kimura et al. also disclose that the diaphragm separates the piezoelectric element from the discharge liquid (Fig. 2).

Regarding claim 34:

Kimura et al. also disclose that the piezoelectric element and the drive integrated circuit are attached to the substrate by an adhesive (21-23; Fig. 2).

Regarding claim 35:

Kimura et al. also disclose that the piezoelectric element and the drive integrated circuit are attached to the substrate and are spaced apart from one another (Fig. 2).

Regarding claim 36:

Kimura et al. also disclose approximating a temperature of the piezoelectric element includes approximating a temperature of a substrate in thermal contact with the piezoelectric element and the drive integrated circuit (col. 9, lines 10-14 and Fig. 2).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura et al. (US 6386672 B1) in view of Kubo (US 6257688 B1).

Regarding claims 3 and 18:

Kimura et al. disclose all claimed limitations except that the cooling drive signal is set to a low frequency level that does not cause the piezoelectric element to heat the discharge liquid.

However, Kubo disclose a cooling drive signal that is set to a low frequency level that does not cause the piezoelectric element to heat the discharge liquid (col. 6, lines 36-40).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize a cooling drive signal that is set at a low frequency into the invention of Kimura et al. The motivation for doing so, as taught by Kubo, is to avoid spray of ink when the temperature is high (col. 6, lines 50-54).

Claims 4 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura et al. (US 6386672 B1) in view of Tajika (US 5861895).

Regarding claims 4 and 19:

Kimura et al. disclose all claimed limitations except that the cooling drive signal has a waveform shape as to cause droplets of maximum weight.

However, Tajika discloses a cooling drive signal with a waveform shape as to cause droplets of maximum weight (col. 11, lines 33-35).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize Tajika's waveform to provide droplets of maximum weight into the invention of Kimura et al. The motivation for doing so, as taught by Tajika, is to minimize problems with temperature control (col. 11, lines 25-28).

Claims 6 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura et al. (US 6386672 B1) in view of Nozawa (US 6499821 B1).

Regarding claims 6 and 21:

Kimura et al. disclose all claimed limitations except that, if the number of discharges within a predetermined time performed in response to the normal drive signal exceeds a predetermined threshold number of times, then the droplets are discharged from the aperture by the cooling drive signal.

However, Nozawa disclose that, if the number of discharges within a predetermined time performed in response to the normal drive signal exceeds a predetermined threshold number of times, then the droplets are discharged from the aperture by the cooling drive signal (col. 8, lines 1-12)

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize Nozawa's threshold discharge count into the invention of Kimura et al. The motivation for doing so, as taught by Nozawa, is to avoid a "scorch" condition (col. 7, line 65 – col. 8, line 6).

Claims 7 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura et al. (US 6386672 B1) in view of Mikami (US 4633269).

Regarding claim 7:

Kimura et al. disclose all claimed limitations except that the cooling discharge by the cooling drive signal is carried out between normal discharges of droplets by the normal drive signal.

However, Mikami discloses a cooling discharge by a cooling drive signal that is carried out between normal discharges of droplets by the normal drive signal (col. 5, lines 40-46).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize Mikami's alternating discharges into the invention of Kimura et al. The motivation for doing so, as taught by Mikami, is to control the temperature (col. 5, lines 36-38).

Claims 9, 11-13, 24, and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura et al. (US 6386672 B1) in view of Usui et al. (US 6981761).

Regarding claims 9 and 24:

Kimura et al. disclose all claimed limitations except that the discharging liquid is an electrically conductive material for forming a wiring pattern.

However, Usui et al. disclose a discharging liquid that is an electrically conductive material for forming a wiring pattern (col. 27, lines 13-15).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to discharge an electrically conductive material from the invention of Kimura et al. The motivation for doing so, as taught by Usui et al., is to enable the manufacture of wiring (col. 27, lines 13-15).

Regarding claims 11 and 26:

Kimura et al. disclose all claimed limitations except that the discharge liquid is a resin for forming a color layer of a color filter.

However, Usui et al. disclose a discharging liquid that is a resin for forming a color layer of a color filter (col. 25, lines 28-31).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to discharge a resin from the invention of Kimura et al. The motivation for doing so, as taught by Usui et al., is to enable the manufacture of a color filter (col. 25, lines 28-31).

Regarding claims 12, 13, 27, and 28:

Kimura et al. disclose all claimed limitations except that the discharge liquid is a fluorescent organic compound exhibiting electroluminescence.

However, Usui et al. disclose a discharge liquid that is a fluorescent organic compound exhibiting electroluminescence (col. 27, lines 27-30).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to discharge an electro-optic material from the invention of Kimura et al. The motivation for doing so, as taught by Usui et al., is to enable the manufacture of EL display devices (col. 27, lines 24-27).

Claims 10 and 25 rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura et al. (US 6386672 B1) in view of Shinoura (US 6714173 B2).

Regarding claims 10 and 25:

Kimura et al. disclose all claimed limitations except that the discharge liquid is a transparent resin for forming a microlens.

However, Shinoura discloses a discharge liquid that is a transparent resin for forming a microlens (col. 9, lines 40-43).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to discharge a transparent resin from the invention of Kimura et al. The motivation for doing so, as taught by Shinoura, is to produce lenses (col. 9, lines 22-25).

Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura et al. (US 6386672 B1) in view of Ishizaki (US 6454377 B1).

Regarding claims 31 and 32:

Kimura et al. disclose all claimed limitations except that the temperature of the discharge liquid is determined by detecting a temperature of the piezoelectric element.

However, Ishizaki discloses that the temperature of the discharge liquid is determined by detecting a temperature of the piezoelectric element (col. 16, lines 32-40).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to modify the position of Kimura et al.'s temperature sensor to measure the temperature of the discharge liquid instead of the ambient temperature. The motivation for doing so, as taught by Ishizaki, is so that ink droplets may be ejected in a stable manor irrespective of the changes in ink due to temperature (col. 16, lines 40-43).

Response to Arguments

Applicant's arguments filed 8/14/2007 have been fully considered but they are not persuasive. Applicant argues that Kimura et al. (hereinafter known as Kimura) fails to disclose a droplet discharging apparatus or method that selects between a normal drive signal and a

cooling drive signal based on an approximate temperature of a liquid discharged from the droplet discharging apparatus.

Specifically, Applicant argues that Kimura discloses controlling a recording head based on a detected temperature environmental temperature of a semiconductor substrate, and thus does not perform control based on an approximated temperature of a liquid discharged from the droplet discharging apparatus. However, upon review of the original disclosure, Examiner notes that Applicant has not disclosed these limitations in a manner sufficient to satisfy the first paragraph of 35 U.S.C. 112. Therefore, this argument is moot. Further, Kimura discloses detecting a temperature of a semiconductor integrated circuit, which is taken to be indicative of the environmental temperature surrounding the substrate (col. 8, lines 40-41). Kimura clearly discloses that the liquid ink is included in surrounding environment (Fig. 2), especially in light of the disclosure that the temperature of the semiconductor integrated circuit changes in connection with the temperature of the pressure generation chamber that contains the liquid ink (col. 9, lines 10-16). Therefore, Kimura discloses controlling the recording head based on a detected temperature that approximates the temperature of the liquid ink contained within the pressure generating chamber.

Applicant also argues that Kimura does not select between a pair of signals because Kimura discloses adjusting the normal drive signal to obtain a cooling drive signal. Examiner respectfully disagrees. Kimura discloses a process selecting between a drive signal that is directly transmitted to the piezoelectric vibrator, and a drive signal that is decreased to a lower level. Kimura discloses that the selection is made in accordance with the environmental temperature (col. 8, lines 47-55). The manner in which the normal drive signal and the cooling drive signal originated is irrelevant since the currently amended claim language merely states

that the "control unit selects between the normal drive signal and a cooling drive signal." Because Kimura discloses a control unit that selects between a normal drive signal (that signal supplied directly to the piezoelectric vibrator) and a cooling drive signal (that signal decreased to a lower level), Kimura properly discloses this claim limitation.

Communication with the USPTO

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shelby Fidler whose telephone number is (571) 272-8455. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on (571) 272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Shelby Z. Fidler 10/10/2007

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